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# INFLUENCE OF FLIPPED LEARNING STRATEGY ON HIGH SCHOOL STUDENTS' LEARNING OUTCOMES IN BIOLOGY IN OSUN STATE

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## Introduction

In Nigeria, Biology occupies a central position among all science subjects. It is a core subject for, Agricultural science, Nursing, Medical science Pharmacy, Synthetic industry, Textile science, Chemical technology. Biology contributes to the quality of life and nation building in all aspects of human endeavor proved by Research evidences (Abimbola, 2013). Therefore, for any meaningful development to take place, every nation must embark on knowledge and skills of science and technology (including Biological Sciences) for rapid and sustainable social, economic, political and technological advancement.

In spite of the importance of Biology education to nation building, students' achievement in biology at Senior Secondary School level is not encouraging. Previous results of Senior School Certificate Examination (SSCE) conducted by National Examinations Council (NECO) (NECO, 2013) reveals that Biology students always perform poorly. From the analysis of the 2013/2014 NECO results, the candidates' results in the science subjects such as Biology, Chemistry and Physics were generally poor. Some researchers have attributed the students' poor performance in biology was due to the abstract concepts of internally situated organs and systems which ordinarily could not be easily accessed. Nervous system, excretory system, respiratory system, blood circulatory system, digestive system, tissue and supporting systems are all complex and internal structure in animals among others (Singer, 2015).

This standpoint of the Flipped classroom model, and its potential benefits for the teaching and learning process, different subject domains and educational levels have been investigated by a significant body of research (Bishop & Verleger, 2013**;** Giannakos, Krogstie, & Chrisochoides, 2014; Lo & Hew, 2017). More specifically, the clear majority of this pool of evidence argues that Flipped classroom model can indeed deliver diverse benefits, helping teachers through spanning to improve the teaching and learning conditions for their students ( Kostaris, and Sergis, Sampson, Giannakos, & Pelliccione, 2017**;** Aidinopoulou & Sampson, 2017), and also enhancing students' cognitive learning outcomes (Kong, 2014), skill development ( Tanner & Scott, 2015) as well as overall motivation **(**Baepler, Walker, & Driessen, 2014; Sahin, 2015).

However, a shortcoming of existing works is that they have focused on investigating the impact of flipped classroom on particular aspects of students' learning, primarily cognitive

learning outcomes and overall motivation (Lo & Hew, 2017). More specifically, even though the impact of flipped classroom model enhanced the learning effectiveness of students' cognitive learning outcomes and overall motivation has been repeatedly investigated, there are still very scarce insights regarding the potential underlying reasons for this impact. In particular, there is still limited understanding regarding how flipped classroom model can affect students' internal dispositions (i.e., level of satisfaction) and also fulfill their motivational 'needs' for engaging in the learning process, which can ultimately lead to the recurrently observed improvements in performance and overall motivation (Abeysekera & Dawson, 2015).

By providing an opportunity for students to use their new factual knowledge while they have access to immediate feedback from peers and the instructor, the flipped classroom helps students learn to correct misconceptions and organize their new knowledge such that it is more accessible for future use. Furthermore, the immediate feedback that occurs in the flipped classroom also enable students recognize and think about their own growing understanding. Researchers concluded that while a promising strategy, flipped learning does not work in all contexts. They stressed that more research is needed to determine how and when flipping work to promote student learning. Blended learning environments supported by the Flipped Classroom Model have been the subject of increased attention in both research and practice (O' Flaherty & Phillips, 2015; Lo & Hew, 2017).

Moreover, Foldnes (2016) examined the effect of flipped classroom instructional strategy and conventional lecture method and found that students' examination scores did not differ between the lecture classes and the flipped classroom. For students to succeed using Flipped Classroom Model, they should have high retentive memory. Fakayode (2012) defined retention as individual ability to hold information or store learned material for future use. The common problem in high schools is poor retention among high school students offering Biology. Concepts learned tend to fade with time when not put to use, or not properly retained, hence, lead to forgetting and loss of knowledge.

## Statement of the Problem

Considering the fact that Biology involves the study of life and living organism, including their structure, function, growth, origin, evolution, and taxonomy within a limited classroom period which is inadequate for the extensive coverage of the curriculum, it became expedient for classroom teaching to be enriched with new and innovative pedagogical skills in order to reinforce learning and maximize the allocated time towards greater students' learning effectiveness in Biology. More so, there is need to engage the learners in activities that will encourage the acquisition of problem-solving skills and a scientific attitude which is not being achieved as a result of poor laboratory facilities and conventional teaching activities in Biology courses.

## Purpose of the Study

The specific Objectives of the study are:

1. To examine the influence of "flipped learning strategy" on High School students' learning outcomes in Biology; and

2. To investigate the influence of flipped learning strategy on high school student's learning outcomes in Biology based on gender.

## Research Question

1. What is the influence of flipped learning strategy on high school students' learning outcomes in Biology?

## Research Hypothesis

**$H_{01}$:** There is no significant difference in the influence of flipped learning strategy on high school male and female students' learning outcomes in Biology.

# METHODOLOGY

## Research Design

This study adopted a descriptive survey to investigate influence of flipped learning strategy on high school student' learning outcome in biology in Osun State High School.

## Population of the Study

The population for this study consist of some high school in Osun State offering Biology.

**Sample and Sampling Techniques**

The sample in the study consists of 350 respondents. Simple random sampling technique was used in the selection of 12 high schools in Osun State. Stratified random sampling techniques was used in selecting 350 students from 12 randomly selected high schools.

**Research Instrument**

The instrument used for data collection in this study was inventory titled influence of flipped learning strategy on high school students' learning outcome in Biology in Osun State. The inventory has two sections, Section (A) consist of (5) items to elicit the biodata details of the respondents, SECTION (B) consist of (20) items. The inventory has five point likert scale of "Strongly agree" (SA), "Agree" (A), "undecided" (U), "Strongly Disagree" (SD) to "Disagree" (D).

**Validity of Instrument**

To establish the validity of the instrument that was used for this study, the draft inventory was given to four experts in the department of Science Education at the faculty of Education for proper assessment and adequate correction of the instrument. Expert in test and measurement also examine the inventory. The corrections made were effected and final draft was produced.

**Reliability of Instrument**

The reliability of the inventory was established through test re-test method. This involved the administration of the instruments to some Osun State High School students' that was not part of the actual study. The inventory was administered twice within an interval of two weeks on twenty students in five High Schools which was not included in the sample. The two sets of scores were correlated using Pearson Product Moment Correlation.

**Procedure for Data Collection**

The researcher visited the selected high school in Osun State to administer the instrument on the respondents. 350copies of inventory was administered and collected back by the researcher personally with the help of research assistance.

## Method of Data Analysis

The descriptive statistics that was used was frequency counts and percentages with mean deviation.

## DATA ANALYSES AND RESULTS

This chapter presents the data analyses and interpretation of data collected for the study through the administered instrument (inventory). The study is a descriptive research; hence, the results are presented in a descriptive format using frequency count, percentage, and mean for the demographic information and the research questions respectively. All analyzed data are represented on tables.

## Demographic Information

The data collected and analysed in this section represents the variables of focus for the study and background information of high school students that were actively involved in the study. The demographic information in which data were collected and analysed includes academic class, gender, and age group which are presented on tables as follows:

**Table 1: Distribution of Students According to Gender, Age Group, and Academic Level**

| **Gender** | **Frequency** | **Percentage (%)** |
|---|---|---|
| Male | 108 | 30.9 |
| Female | 242 | 69.1 |
| **Total** | **350** | **100** |
| **Age Group** | **Frequency** | **Percentage (%)** |
| 13 – 15 Yrs. | 239 | 68.3 |
| 16 – 18 Yrs. | 95 | 27.1 |
| 19 and Above | 16 | 4.6 |
| **Total** | **350** | **100** |
| **Academic Level** | **Frequency** | **Percentage (%)** |
| S S 1 | 183 | 52.3 |
| S S 2 | 98 | 28.0 |
| S S 3 | 69 | 19.7 |

| | | |
|---|---|---|
| **Total** | **350** | **100** |

Table 1 indicates the distribution of high school students that participated in the study. The table revealed that most of the students were females 69.1% over male students 30.9%; more students between the age group 13 to 15 years formed larger percentage of the sample size than older students (68.3%>27.1%>4.0%); and S.S.1 students participated in the study than those in higher classes (52.3%>28.0%>19.7%). This implies that majority of the students were fresh in senior classes, prospective, females, and adolescents, thus, majority of the students are capable to respond to the instrument.

## Results

The results of data collected that were analyzed to answer research questions of the study are represented on tables and subsequently interpreted.

## Analysis of Research Questions

**Research Question One:** What is the influence of flipped learning strategy on high school students' learning outcomes in Biology?

**Table 2: Mean and Rank Order of Influence of Flipped Learning Strategy on High School Students' Learning Outcome in Biology**

| S/N | Items | Mean |
|---|---|---|
| 1. | Flipped learning strategy help me to be able to engage in Biology classroom collaboration | 3.15 |
| 2. | I understand Biology topics in a flipped classroom | 3.07 |
| 3. | Flipped learning strategy gives me responsibility for my own learning | 3.16 |
| 4. | Flipped learning strategy has effect on my performance in Biology | 3.12 |
| 5. | I had a favourable perception about flipped learning strategy noting the ability to pause, rewind and review lectures | 3.54 |
| 6. | No, use of flipped learning strategy has negative impact on my academic performance in Biology | 2.59 |
| 7. | I found the use of flipped classroom interesting in teaching Biology | 3.12 |
| 8. | Often times, I do not have motivation while learning in a flipped classroom | 2.45 |

| | | |
|---|---|---|
| 9. | Flipped classroom enhance my knowledge of basic concept that are been taught in Biology | 3.12 |
| 10. | The use of flipped classroom has positive impact on my learning | 3.08 |
| 11. | I do have the zeal and motivation while learning in a flipped classroom | 3.11 |
| 12. | Shortage of power supply will affect me to learn Biology in a flipped classroom | 3.09 |
| 13. | The use of flipped classroom often aids my learning ability | 3.12 |
| 14. | Flipped learning strategy when effectively use enhance my knowledge of basic concept that are been taught in Biology | 3.14 |
| 15. | Flipped classroom makes learning effective for me in Biology | 3.19 |
| 16. | Flipped learning strategy instructional format consistently performed better throughout the course than those students in the traditional course | 3.05 |
| 17. | The flipped learning strategy gives me more class time to practice Biology problems | 3.11 |
| 18. | I feel confident about the materials after watching the videos and after coming to class to work on the problems with others | 3.16 |
| 19. | Learning how to use a flipped classroom will benefit me in my future | 3.19 |
| 20. | Social media (YouTube, Twitter, Facebook) is not an important part in my learning in a flipped classroom | 2.14 |
| | **Grand Mean** | **3.04** |

Table 2 shows the mean and rank order of influence of flipped learning strategy on high school students' learning outcomes in Biology. Based on the decision scale of a 5-Point Likert scale of 3.0 benchmark, all of the Items were positively responded to. Significantly as a characteristic of flipped learning strategy, students claimed that it helps them to learn Biology concepts better; the use of flipped classroom is interesting; they are more motivated to learn with flipped classroom; it has positive impact on students learning of Biology concepts. Cumulatively, the grand mean of 3.04>3.00 indicated that flipped learning strategy has a positive influence on high school students' learning outcome in Biology.

**Hypothesis Testing**

**Research Hypothesis One:** There is no significant difference in the influence of flipped learning strategy on high school male and female students' learning outcomes in Biology

**Table 4:** *t*-test Analysis of Gender Difference in the Influence of Flipped Learning on High School Students' Learning Outcome in Biology

| Gender | N | X | SD | df | *T* | Sig. (2-tailed) | Remark |
|---|---|---|---|---|---|---|---|
| Male | 108 | 3.47 | .48 | | | | |
| | | | | 348 | .32 | .89 | **Accepted** |
| Female | 242 | 3.43 | .46 | | | | |

From Table 4, it can be deduced that there was no significant difference in the influence of flipped learning strategy on high school male and female students' learning outcomes in Biology. This is reflected in the findings of the hypotheses tested df (348), t= .32, p>0.05. Thus, the hypothesis which states that "there is no significant difference in the influence of flipped learning strategy on high school male and female students' learning outcomes in Biology" is accepted.

## Conclusions

Based on the findings the study was a significant effect of the use flipped instruction model on student learning outcomes in Biology, which means that flipped learning strategy is one of the effective instruction strategies to teach concepts in Biology. Because the use of Video recoded lecture, simulations, the in-class discussion and all other enrichment activities allowed by moving content delivery outside of class time provides opportunities for students to develop vital learning skills needed in the 21st century including critical thinking, creativity, communications, and collaboration. This is in support of the conclusion drawn from Flaherty and Philips (2015) indicating that there is much indirect evidence emerging of improved academic performance and student and staff satisfaction with the flipped approach but a paucity of conclusive evidence that it contributes to building lifelong learning, motivation, improve students' team-based skills and peer-to-peer interaction, customize or differentiate learning, make students the center of learning or encourage student ownership of learning, increase class freedom/enjoyment, improve learning outcomes, dealing with absences, encourage faculty collaboration, and compensate for limited classroom space.

## Recommendations

1. The flipped classroom strategy should be adopted into teacher-education curriculum and encouraged by curriculum developers.

2. Necessary facilities that can facilitate the effective use of flipped learning strategy should be provided in all schools and homes.

3. Appropriate avenues should be created for Biology teachers in all educational sectors and even educational technologist to discuss and work on learning platform that can be used to all other topic in Biology.

4. Schools should facilitate student progress in high school Biology classrooms by instructing and motivating students to view upcoming curriculum topics via digital media.

5. Increase the communication between the administrators, teachers, students, and parents: Before the implementation of any flipped classroom instruction teachers should explain to the administrators, parents, and students the purpose of using flipped classroom instruction in teaching.

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